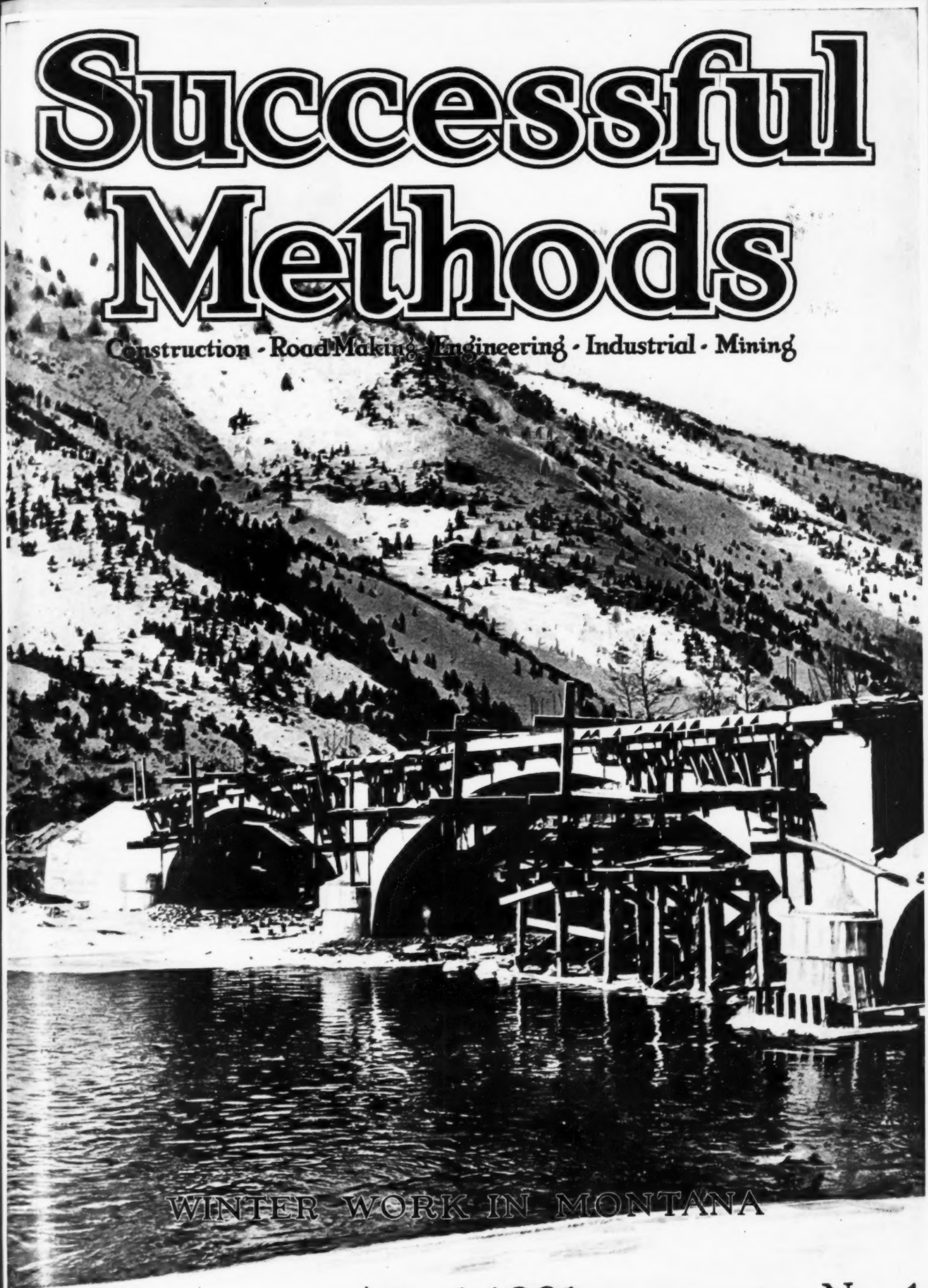
Successful Methods

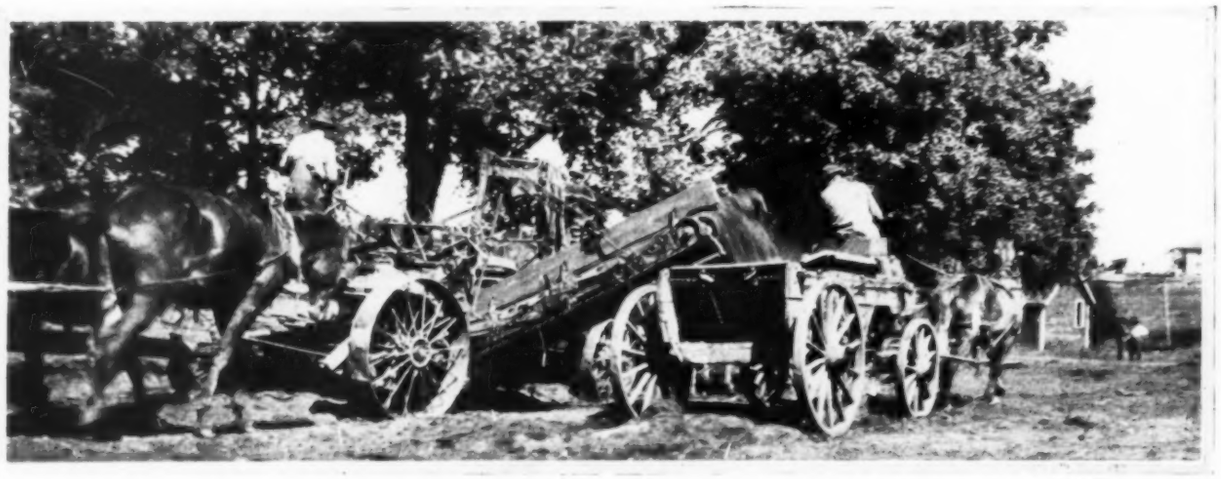
Construction - Road Making - Engineering - Industrial - Mining



WINTER WORK IN MONTANA

Vol. 3 April 1921 No. 4

You Can't Overwork a Western



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Successful Methods

A Magazine of Construction Service

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A Year Ago—Now—The Coming Year

A YEAR ago nearly every kind of business in this country was going ahead under forced draft. Prices were high—and going higher. Practically none could see anything except good times for several years. Anyway, few of those who thought otherwise got their ideas into print then. But our great newspapers printed almost every day assumed authoritative opinions about high prices staying high. For example, they said sugar could not come down for at least two years. In many other lines of commodities we were supposed to face a world-wide shortage. What happened is too unpleasantly recent to review.

Now—there are just as few who can see anything except the hole in the doughnut. A man who expresses an optimistic idea these days is looked upon with suspicion.

Is the near future so black, after all?

This magazine is not going to attempt to answer. It has in mind how most so-called economic experts have missed the market pitifully since 1914. It will attempt to avoid their convincing arguments. They proved a lot of things which couldn't happen—but did. Now they are proving more things which cannot happen—but may.

True enough, this is no time to ignore what business is up against. But one thing sure, in many lines conditions cannot get any worse. In some industries there already has been an upward turn, while others may not yet have reached bottom.

Whatever the future may be, we shall get nowhere by weeping over the present outlook. What is needed more than anything else right now is an honest day's work at reasonable pay; this holds good from the big boss down to the man with a pick. Such a state of affairs apparently is approaching rapidly. If so, some of our economic experts may be in for another spill.

It's Never Too Cold to Work

SNOW covered mountains may seem out of place on the cover of the April issue of SUCCESSFUL METHODS. Spring is in the air and most of us are glad that winter has departed. So why remind us of it?

The reason for it is just this. We don't want our readers to forget that the construction game is such a big and important factor in our national life that even the rigors of a Montana winter can't halt its progress. Construction has got to go on regardless of the seasons. More and more that fact is impressing itself upon the minds of men, and it will not be many years before winter work will be the usual thing.

That is why SUCCESSFUL METHODS prints in this issue two articles about jobs which are just being completed at the time when most contractors are coming out of their winter's sleep to begin a new season's work. One job in Montana, another in Massachusetts, both in Northern States where the weather gets pretty cold. But the men back of these jobs laid their plans without worrying about the weather. "It's Never Too Cold to Work" is their slogan, and it is a slogan that is worth thinking about.

Living Up to Our Name

IN pursuance of its policy of living up to its name, SUCCESSFUL METHODS printed last August an article describing the construction of the Northern Central grain elevator at Baltimore. This article pointed out the advantages of all concrete construction so far as grain elevators are concerned in the following words:

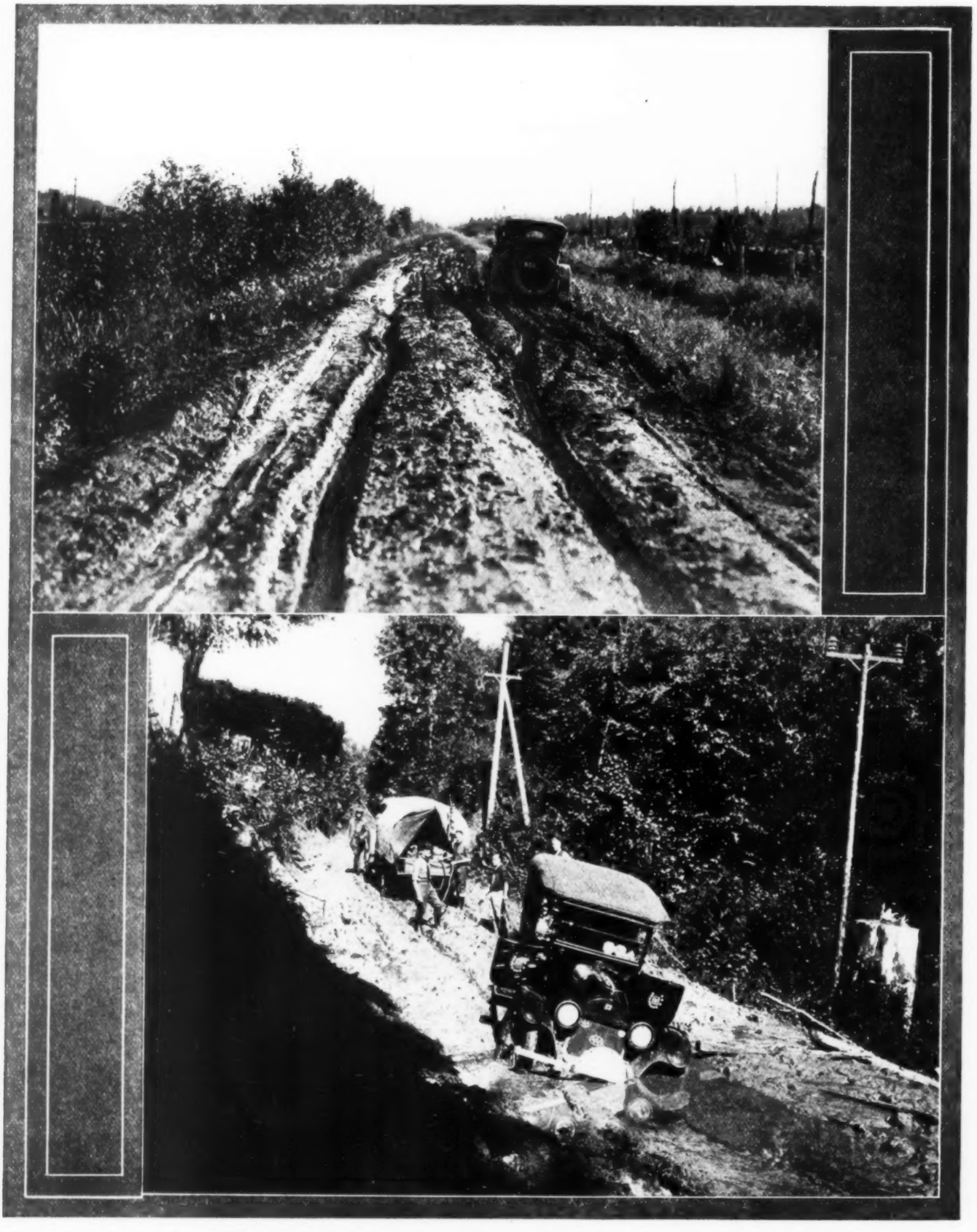
"Handling grain is a dusty job, for every time the grain is moved, a little more dust is shaken loose. And grain dust is dangerous; it explodes. Therefore, a method of construction which keeps the dust from finding lodgment here, there and everywhere, and reduces the danger of a disastrous explosion to a minimum, is the most successful. That is where concrete scores. Its use makes it possible to build elevators with few ledges and sills, few beams and other similar dust collectors. Steel frame elevators are still being built but it requires only a brief glance into one of them, and a look at the maze of beams and girders, with their convenient angles for dust collecting, to realize how good a piece of work the Northern Central Elevator is."

The giant grain elevator in Chicago which blew up the other day was of steel frame construction.

Progress on the Maricopa Job

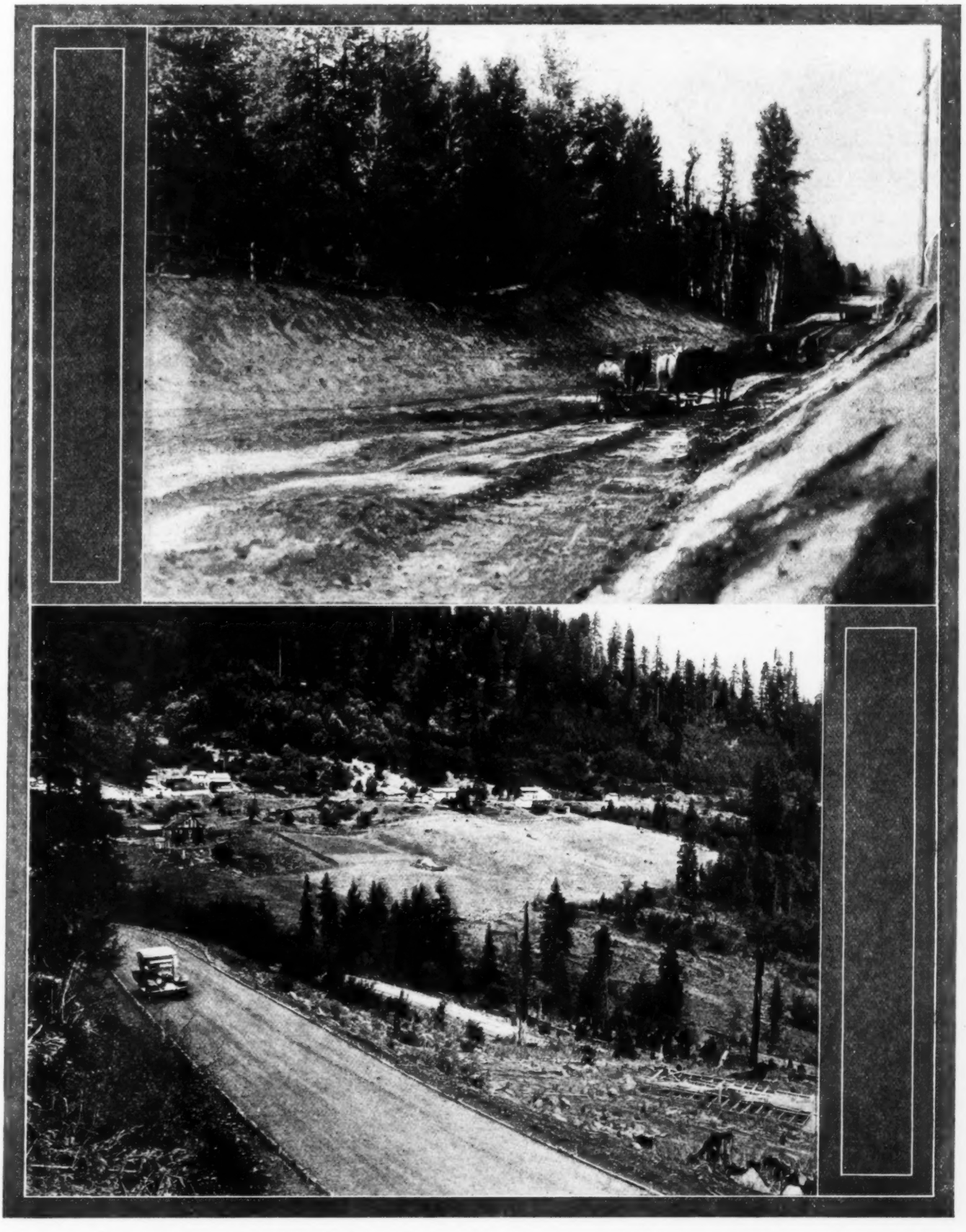
WORD comes from Maricopa County, Arizona, to the effect that Twohy Brothers are keeping up to their schedule on the "Biggest Road Job." The average maximum production per day for mixers has reached 648 lineal feet of 16 inch concrete road per mixer. The work is progressing at the rate of about 7 miles of finished road per month.

A National Disease



"Somewhere in the United States" tells the story of these two photographs. It is not necessary to locate them more precisely—as every section has some roads like these at this time of year. (Copyright International.)

That Is Being Cured



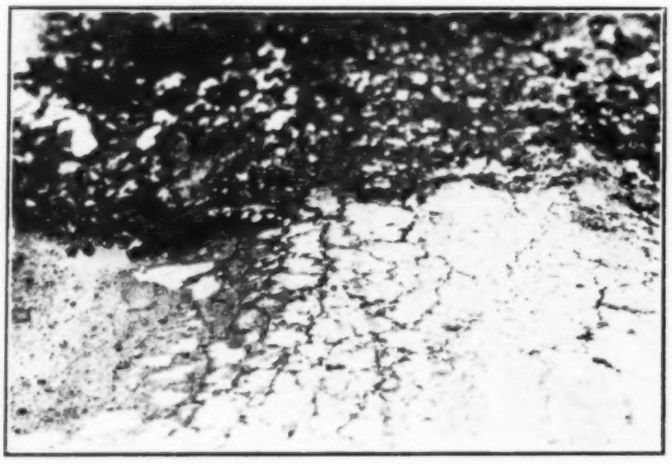
These two photographs can be located definitely. The upper picture shows a grading job in Idaho, and underneath it is a road of which Oregon may well be proud. (Copyright International.)

GETTING DOWN TO THE SUBGRADE

Investigation Shows That Pavements of Uniform Thickness Are Not Right

By H. G. SHIRLEY
Secretary, Federal Highway Council

MUCH depends on the solution of the subgrade problem in such a way as to stabilize the foundations of our highways, for without such a solution the large amount of money that will be expended in highway construction will not bring about the best results.



A CLOSE-UP OF A MACADAM SURFACE LAID ON A CLAY SUBGRADE. ALTHOUGH ONLY 4 YEARS OLD, IT HAS GONE TO PIECES

Heretofore much of the money expended in highway construction has been fairly well invested, and until the advent of the heavy vehicle with its large load, the need of a more stable foundation was not so pressing as it is at the present time. This great need is now facing us, and upon its solution will depend to a great extent whether the many millions of dollars to be annually expended in highway construction will be spent in a way that will give the greatest service at the least cost and have a life in keeping with the life of the bonds issued to cover the cost of the work.

A great deal of money has been expended in testing and developing the road surfacing, and this has been carried on quite successfully, the different types having strong advocates who have developed them up to the highest standard of efficiency. In developing these types there has been quite a good deal of rivalry between individuals and companies, each advocating its particular favorite, and much good has come from this intense development and study. The money that has been expended in such development has been of value to all the people.

The subgrade problem affects every type of construction and therefore has not appealed to the individual or company in such a way as to warrant a large expenditure for its solution. It therefore was necessary that an organization that is interested in the development of highways in general rather than any special type of road should take up this subject, and assist the testing department of the Bureau of Public Roads in its efforts to find the solution. The Federal Highway Council's Committee on Subgrade was formed and has taken up this work.

The Committee realized from the first that it would

GOOD SURFACING RUINED BY WEAK SUBGRADE

A CONCRETE ROAD THAT NEVER HAD A FAIR CHANCE TO SURVIVE. A POORLY DRAINED SUBGRADE PLAYED ITS PART IN THE DISASTER

be necessary to interest the scientific men of the country in this subject, and obtain the cooperation of the leading laboratories, universities and State Highway Departments. The Bureau of Public Roads was recognized as the logical department to undertake on a broad and effective scale the scientific investigation, and Thomas H. MacDonald, its Chief, realizing the great importance and the enormous saving its solution would mean to the country, designated A. T. Goldbeck, Testing Engineer, and Mr. Mullis, Investigator, to cooperate with the Committee and become members so as to make its work most effective.

The committee has laid out ten problems, all bearing on the classification, chemical and physical analyses of the soils, volumetric changes due to freezing and thawing, absorption and heat, as well as experimental drainage systems, and the mechanical and chemical treatment of the soils so as to stabilize them and obtain the highest bearing power at a reasonable cost.

So far the investigation has shown that this is a most important problem and that the custom of building highways of uniform thickness rather than of a uniform strength is wrong and there must be an immediate change. Materials must be distributed over the subgrade in such a way as to use a minimum amount of material and give a uniform strength throughout its length. This may mean a less thickness of surfacing over the stable soils and a much thicker surfacing over the unstable soils; or it may mean the same thickness of material over the entire length of contract designed to carry a specified load, treating the subgrade either chemically or mechanically ahead of the laying of the surfacing so as to bring it up to a uniform bearing power. The method of procedure to be adopted will depend upon the soils and the amount of treatment and cost that will be required to bring them up to a uniform bearing value.

The Committee appreciates, however, that in applying any solution of this problem, a practical or horse-sense view must be taken and the work be put on such a basis that a contractor can expeditiously proceed with his construction work, and the changes made in the surfacing not be so frequent as to interfere with the proper progress of the work. It also appreciates that it would not be practical to have a different thickness of the surfacing every few feet, except at occasional spots where exceedingly soft and narrow strata of very low bearing power materials may appear in the foundation. This however may be corrected in most instances by treating such spots previous to the laying of the surface.

It will be exceedingly simple in staking out the road, especially those where rigid type of surfacing must be

used, to set the forms to the finished grades and where necessary to obtain the proper thickness of the surface by digging below the forms the additional thickness required and support the forms on blocks, etc., where soils are not stable enough to support them. This can be worked out without difficulty and there are a number of forms in use which are held in place by heavy iron spikes, driven into the earth, making the form exceedingly stable and capable of withstanding the weight and movement of the finishing machine without any danger of sinking or displacement.

The ingenuity and the ability of the manufacturers of road equipment to meet such conditions in the past will do their work in this case just as readily for when a need exists they have always been able to meet that need in a most efficient manner. When a solution has been reached, it is the aim of all interested that it shall be most practical and in such a workable condition that it can be carried on by a contractor using ordinary unskilled labor.

It is with this in view that the Committee wishes the cooperation of a committee from the Associated General Contractors so that the actual construction details may be worked out in the most practical way.

The value of the proper solution of the subgrade problem cannot be overestimated. The writer has seen the same thickness of surface used over a shale subgrade on hills and mountains, where the shale was of a type and character to almost make a good road surfacing itself, and having a very high bearing power, and a short distance therefrom over low lands, having a soil of clay and really with practically no bearing power, and at certain seasons almost a semi-fluid. If the surface was built thick enough over the clay base to carry the load then it was built entirely too thick over the shale, and the extra material used over the shale was a dead loss to the public and money wasted; or if the surface over the shale was of the proper thickness to give sufficient strength to carry the traffic then the surface over the clay was entirely too weak to withstand the load and a great amout of money would have to be expended for its upkeep or replacement.

This problem must be worked out in such a way that a simple test can be made to find the bearing value of the subgrade after the rough grading has been done and previous to the laying of the surfacing. When this has been determined then a surfacing can be selected that will have a thickness and strength necessary to carry the load or a treatment applied to the subgrade that will bring the bearing power up to a point where a surface of a known strength can be placed on it. This is the problem and it must be solved.

PERUVIAN BRICKMAKING

Adobe Is Used for Construction of Many Important Buildings

THE extent to which adobe is used for building construction in Peru is hard to realize. Some of the finest buildings in the Peruvian cities are built of this material, which, like the adobe of our extreme Southwestern cities, is made by hand from native clay. Many important buildings in Lima are constructed of adobe, and on the opposite page are shown several photographs which illustrate the methods of making the adobe bricks and the way in which they are used in construction work.

The clay from which the adobe is made is found in the desert section where there is no rain. It is plastic when wet and the quality of the bricks depends largely on the skill of the men who make them. A deposit of clay is located as near as possible to the place where it is to be used. The men then dig it up, gather it in piles and then mix it by hand, as shown in the first photograph, using water from the irrigation ditches. They get together in one pile enough to keep them busy for three or four days at the work of making it into bricks. For the actual brick making wooden moulds are used. Before putting the adobe into the moulds, the workman takes some horse manure and dusts it into the mould and on the ground beneath the mould. He then takes the clay, hammers it into the mould with his hand, jiggles the mould slightly and lifts it off the brick, which is left on the ground to dry. The skill of the individual workman counts greatly at this point. The workman moves a few inches away and fills the mould again. As there is no rain, the bricks are left on the ground for a period the length of which depends upon whether it is the cloudy or sunny season, and are burned hard by the sun. They are almost as hard as the ordinary burned building brick used in the United States, and are so tough that there is comparatively little loss in transportation.

They usually are taken to the job on the backs of mules, seven or eight bricks being carried at a time in sacks slung over the animals' backs. This method of transportation is shown plainly in one of the photographs.

The method of using these adobe bricks also is shown in the two pictures of buildings under construction. These buildings are about as high as an average three-story building in the United States. Above the first floor, poles and matting are used to increase the lateral stability of the structure. In both of these photographs the joints are poor judging by North American standards, but they are made this way because of the fact that plaster is later used over them to finish the outside wall. This plaster consists of tinted lime mortar, and some most attractive looking buildings are the result. The cornice work and moulding in plaster are attractively finished. The roof generally is flat and is covered to a depth of 8 to 10 in. with adobe which is filled loose on the flat timbers of which the roof is built. On many of the houses in Lima and other cities these earth-covered roofs are used as gardens. In fact Peru can boast of real "roof gardens" instead of the kind which have captured the name in this part of the world. Their roof gardens are producers rather than consumers.

Peru's Adobe Industry

1—Mixing the adobe.

2—The moulding operation.

3—Getting the bricks to the job.

4—Laying the bricks.

5—After the plaster has been applied.

WINTER WORK IN MONTANA

Concrete Bridge Over Yellowstone River Is About Ready for Traffic

MONTANA seems a little too far to the northward for construction work during the winter months, but the Carter Bridge over the Yellowstone River near Livingston belies that theory. The contractor, B. M. Crenshaw of Livingston, has kept work going on this concrete structure throughout the winter, and expects that it will be ready for traffic just about the time this issue of SUCCESSFUL METHODS reaches its readers.

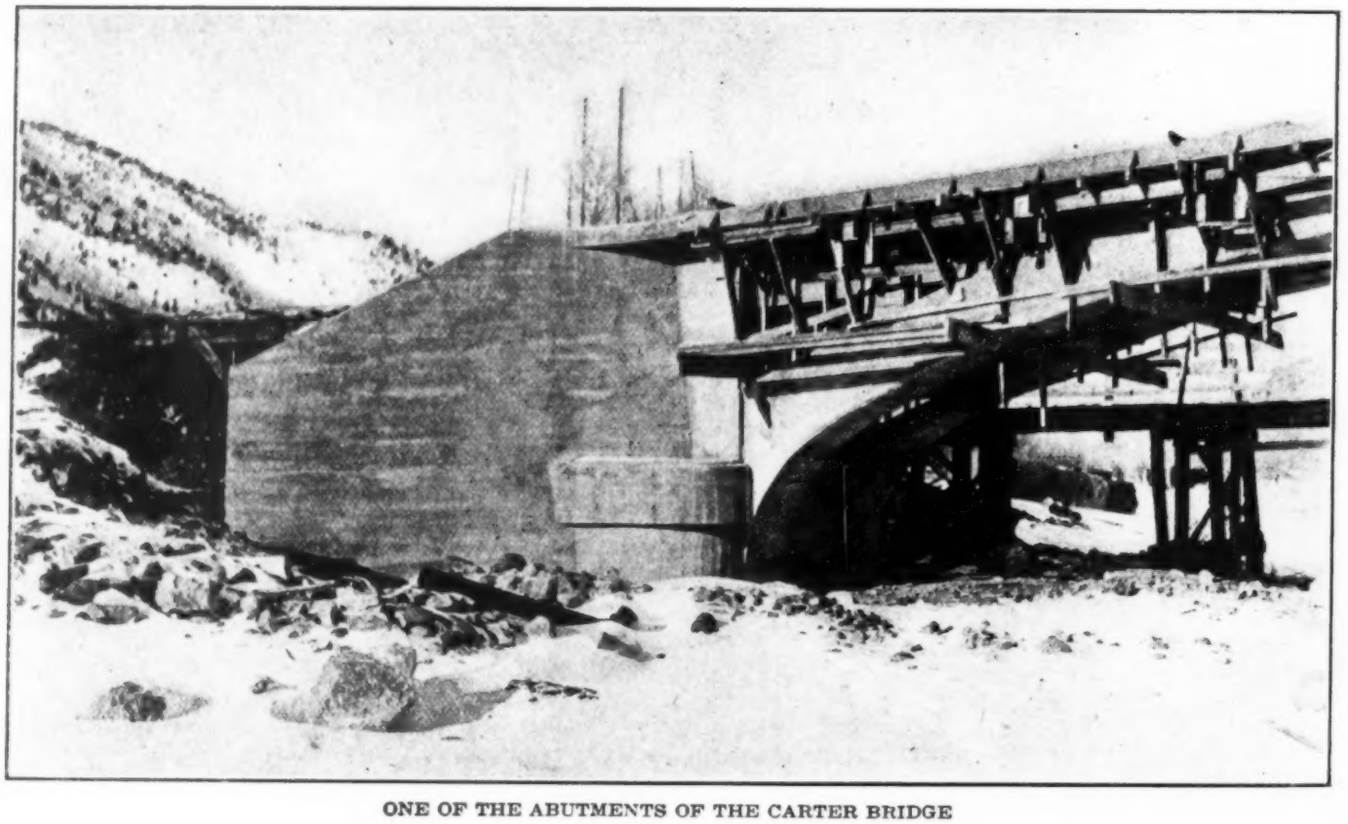
The bridge is being built by the State Highway Commission of Montana with Federal Aid participation and is the second largest bridge of its type now under construction in the state. When this structure was first proposed, it was thought that a concrete arch would be more in harmony with the surrounding country than would a steel bridge. Then again it was deemed advisable, inasmuch as there was first-class sand and gravel at the site, to build a concrete bridge for economical reasons. The ground upon which the foundations are built is composed of compacted sand and gravel and was found to be satisfactory for the arch type of construction. Test borings were made for a depth of 20 ft. below the maximum scour of the river for the purpose of determining the character of the material.

Work on the bridge was first started in September, 1919, but due to several changes in the design of the bridge by the government engineers, the construction was retarded for three months. Much difficulty was encountered in pumping, and it was finally decided to use steel sheet piling. One 6-in. centrifugal pump was all that was necessary to handle the water after the steel cofferdam had been sealed with cinders.

In the east pier the water was 9 ft. deep and the bottom was covered with large boulders. The steel piling were driven through these large rocks to the required depth before any excavation was started. Although there was a heavy pressure on the cofferdam, due to the strong current of the river at this point, no appreciable movement in the cofferdam was noticed. One hundred and eleven wood piles were driven to an average penetration of 16 ft. in each abutment and 36 piles in each pier.

The bridge consists of two 88-ft. 2-in. spans and one center span 93. ft. 8 in. in length, and is of the three-centered type. There is a total of 446 yd. of class A concrete in the job and 950 yd. of class B. The roadway is 16 ft., and the wearing surface is to be gravel. The structure is designed to carry a 20-ton load with 25 per cent impact. There are 14 $1\frac{1}{8}$-in. square longitudinal reinforcing rods in each rib of each span to take care of the tensile stresses.

Good work was done in pouring the concrete during the cold weather. The frost was taken out of the sand and gravel by the use of steam pipes connected to the boiler. The water was also heated, and after the concrete had been poured several large canvases were used to cover the work, and oil stoves placed under them. An average temperature of 55 degrees was maintained for 48 hours after which the canvases were removed. L. A. Hartman, resident engineer for the State Highway Commission, is supervising the construction of the job. The bridge is on one of the main routes to Yellowstone Park.



ONE OF THE ABUTMENTS OF THE CARTER BRIDGE

SPEEDING UP IN NEW ENGLAND

Work of Enlarging Big Oil Refining Plant at Fall River, Mass., Is Pushed Through Winter Months

ENLARGING an oil refining plant of 3000 barrels a day capacity to one of 22,000 barrels a day, in six months' time, without interfering with the operation of the original plant, is the achievement of the Unit Construction Co. of St. Louis, which has just finished work on the new refinery for the New England Oil Co. at Fall River, Mass.

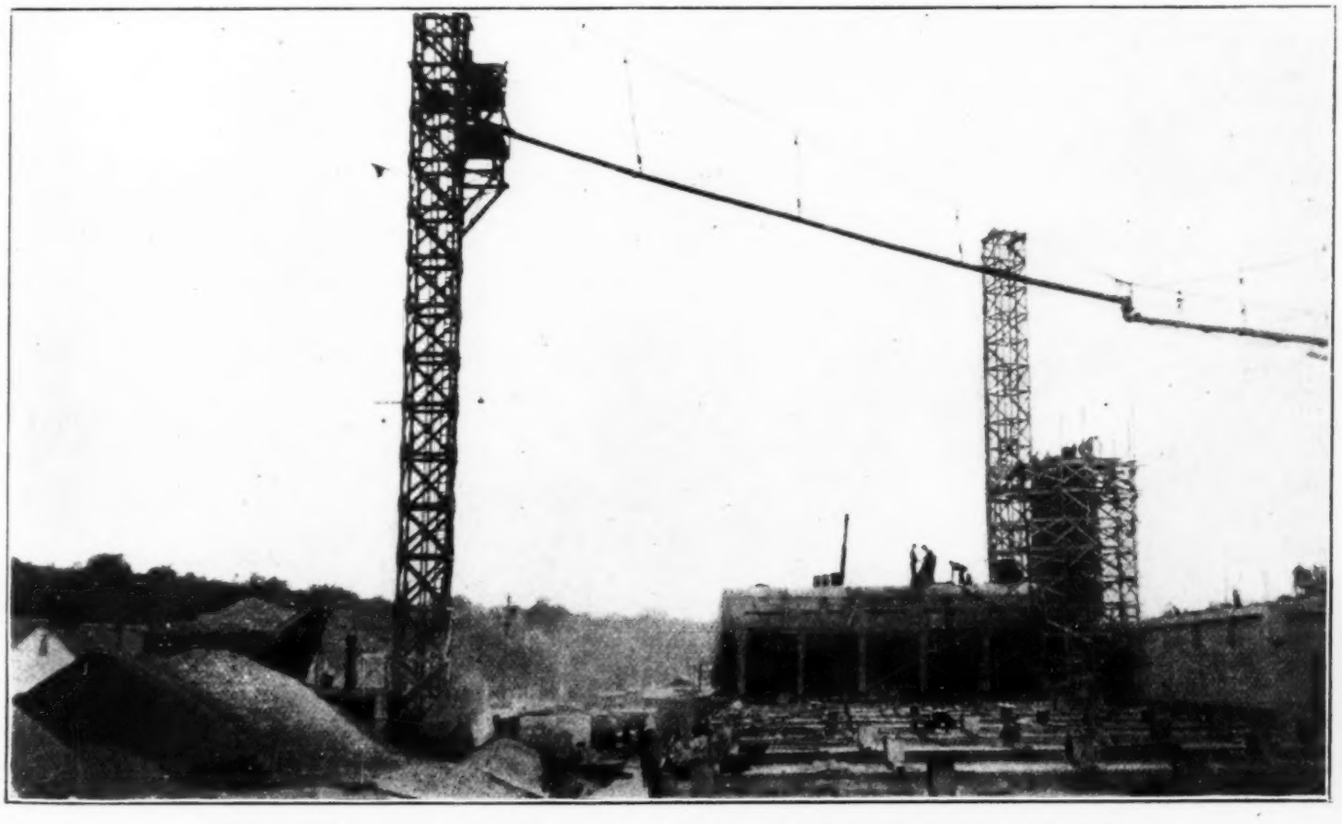
The object of this new $8,000,000 plant, which covers an area of 50 acres situated 22 miles inland on the Taunton River, a navigable tidal stream, is to supply the United States Navy with 3,000,000 barrels annually of a light viscous fuel oil known as Navy A. The crude oil comes from Tuxpan, Mexico.

To begin with, the Roberts Engineering Co. of Boston was appointed engineers, and work on the plans was started May, 1920. The work of excavation was started June 2, and concreting was finished Dec. 2, 1920. When it is remembered that this vast amount of work, which included 220,000 yd. of excavation, 2,000,000 brick, 20,640 yd. of concrete, 700 tons of reinforcing steel, 2258 timber piles, 20,000 sq. ft. of timber dock, 45 miles of pipe lines, and covered practically every phase of construction work from concrete roads, retaining walls, barracks, sewers, etc., to the topping stills and condenser boxes, was done in a matter of six months without stopping for winter weather, and at a time when the labor, material, and transportation situation was at its worst, it will be conceded that it was some job.

A central mixing plant consisting of a ¾ yd. mixer and tower with chutes of 500 ft. radius turned out from 40 to 50 yd. of concrete per hour. Sand was delivered by auto truck from a nearby bank, was fed to overhead bins, discharging directly into the mixer. The photograph shows a steam shovel equipped with a clamshell, about to climb the incline to handle the material into the bins. Stone and cement arrived by barges and was unloaded by means of derricks equipped with clamshell buckets, into bins. Trains of V dump cars drawn by gasoline locomotives, transported the materials to the central mixing plant. In spite of the great area served by the tower and chutes, it was necessary to use an auxiliary tower, and in other instances one bag mixers served outlying concrete work. Chuting into hoppers from which the concrete was delivered by buggies was a method employed extensively.

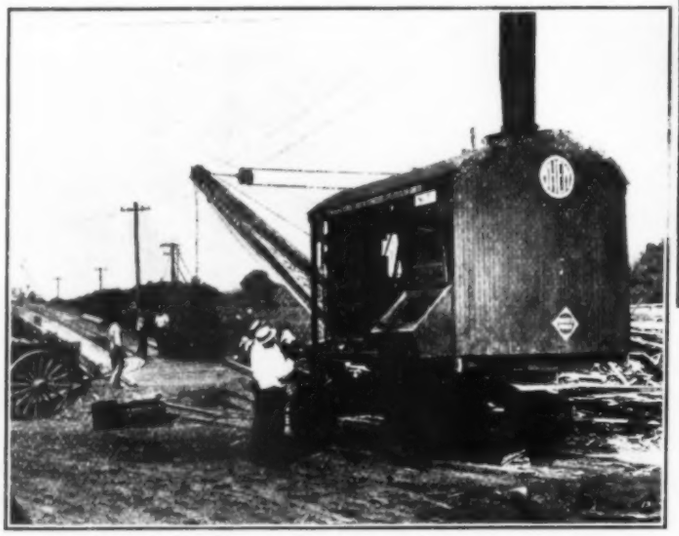
At the bottom of this page is shown the central mixing plant with its accompanying material storage pile. A continuous stream of sand and stone was maintained to the job and stored as shown, thus accumulating a surplus to take care of any delay or interruption of the material shipments. By means of the shovel, equipped with a clamshell, the material in this storage pile was handled over to the hoppers as needed. In the same picture is shown one of the battery of topping stills; one of the four 80 ft. stacks and on the right, the huge condenser box, all in process of construction.

Brick and cement arriving by barge were unloaded by



TOWER AT CENTRAL MIXING PLANT, SHOWING A PORTION OF THE LONG CHUTE

using the small V dump cars as a skip. The cars which were loaded in the barge were picked up by a derrick, trucks and all, and landed on the industrial tracks alongside. A timber bulkhead built along the water front inclosing a basin was used as a disposal place for the excavated material. About 5 acres of new land was made in this manner. Both the piles and the four inch

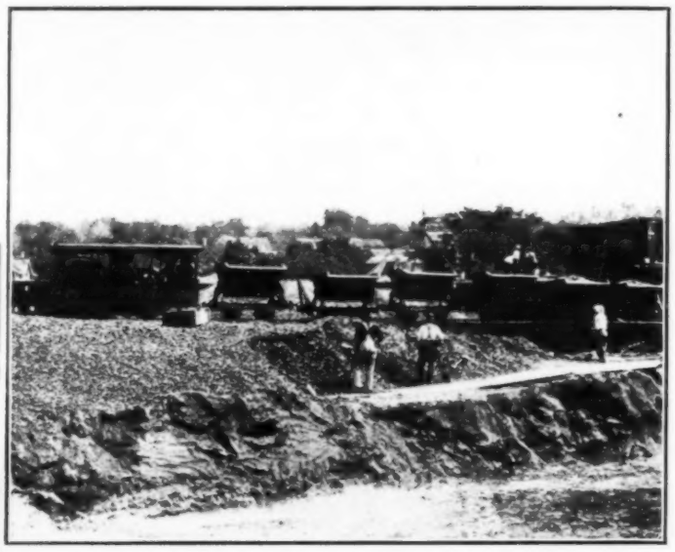


POWER SHOVEL ABOUT TO CLIMB INCLINE

splined sheathing were driven by steam hammers.

In addition to the extensive chemical system of fire protection, earth dikes were constructed around the oil storage tanks as an additional means of fire protection, confining the oil to certian areas should any break occur.

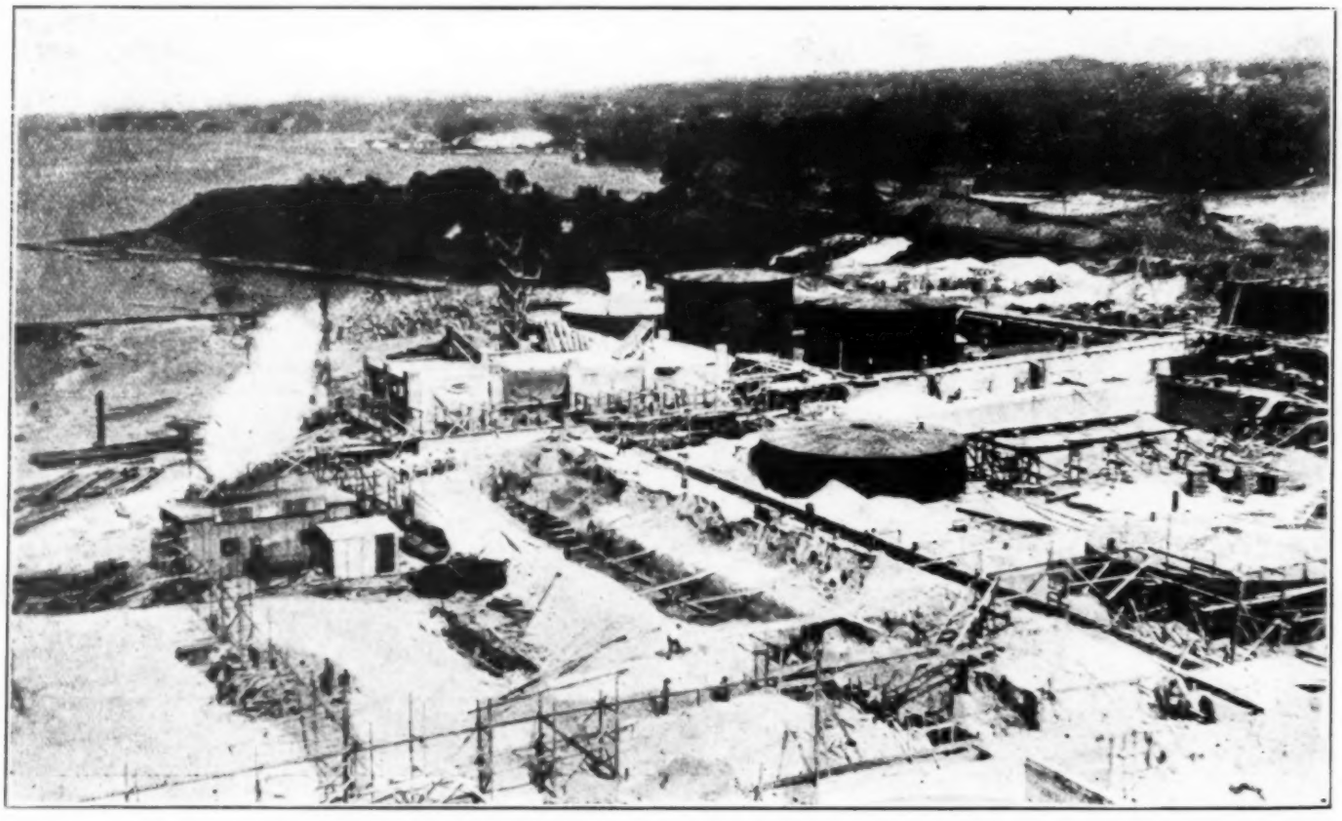
At the peak, 2500 men were employed, fully half being housed and fed on the job. Seven ¾ yd. steam



LOCOMOTIVE AND CARS WHICH TRANSPORTED THE MATERIALS

shovels did practically all the excavation even to the trenches for the pipe lines; four 36-in. gage steam locomotives, fifty 36-in. gage 4-yd. dump cars, two 24-in. gage gasoline locomotives, thirty-two 24-in. gage dump and flat cars, six concrete mixers, two steam hammers, derricks, pumps, clamshell buckets, etc., comprised the equipment.

This job is a good example of what can be done in the way of speed when modern methods and machines are combined with a steady flow of material to the work. All this was done when other jobs were being closed down. The methods and machines have been described. Keeping the materials flowing steadily to the work was accomplished—in the Fall of 1920—but that is another story.



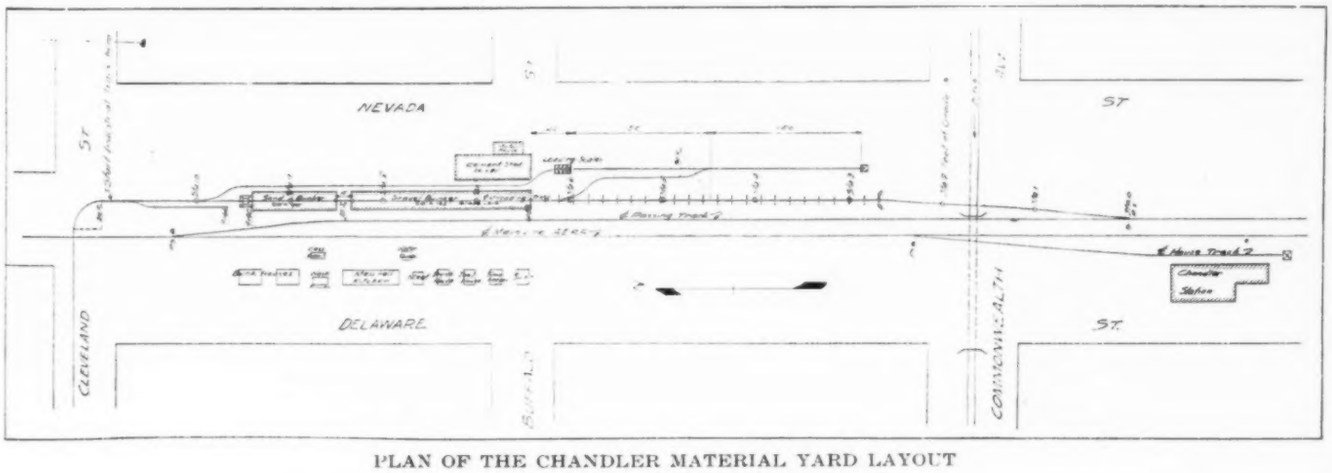
PART OF THE TANK FARM FROM THE TOP OF THE TOWER

MATERIAL YARD LAYOUT ON THE MARICOPA COUNTY ROAD JOB

Large Quantity of Materials to Be Handled Makes Construction of Trestles the Most Economical Method

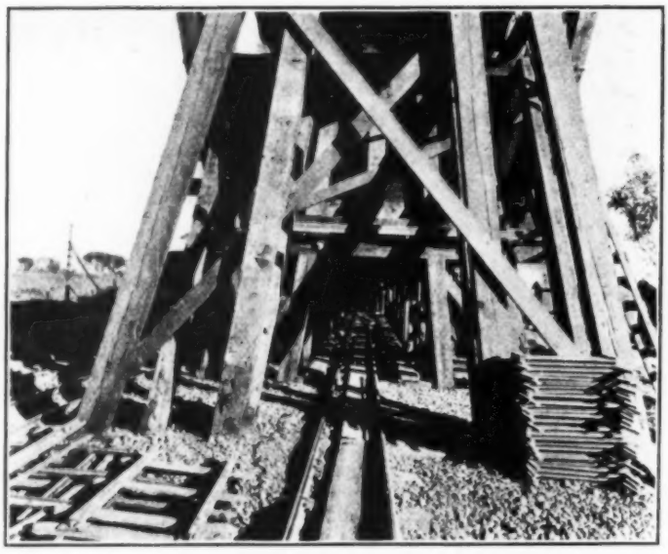
By W. S. ANDERSON

ON a road job as big as that now under way in Maricopa County, Arizona, where 280 miles of concrete road are being built, the size of the job becomes the determining factor in choosing the methods by which the work is done. In an article which appeared in the February issue of SUCCESSFUL METHODS, the way in which the Maricopa project was divided into eight set-ups was described and the reasons for this division were given. This article will deal with the layout and trestle construction at the various material yards where the sand, gravel and cement are transferred from the railroad cars to the industrial cars which carry them to the mixers. Inasmuch as more than 100,000 yards of material are to be handled at each set-up before it is dis-



PLAN OF THE CHANDLER MATERIAL YARD LAYOUT

mantled, it was decided to use trestles with bunkers under them. The use of these trestles makes it possible to employ bottom dump cars and eliminate the crane and clamshell methods of unloading, which works so well on smaller jobs.



THIS PHOTOGRAPH SHOWS THE NARROW GAGE TRACK UNDER THE SAND AND GRAVEL BUNKERS

The first step after deciding to use the trestle method was to locate the proper railroad sidings and then to make a plan layout of the material yard at the siding chosen. The plan layout of the material yard at Chandler which appears below shows the location of the main line, the passing track and the available vacant space for the erection of bins, tunnels or trestles. In this particular case, standard gage railroad trestles were constructed, which required the installation of a separate standard gage track leading off from the passing track.

A 4 per cent grade was established after consultation with the railroad authorities, this grade being reduced to the minimum commensurate with the cost of installation and still not so steep but that the locomotives available on the Arizona & Eastern Railroad system can handle from four to five loaded cars up the grade.

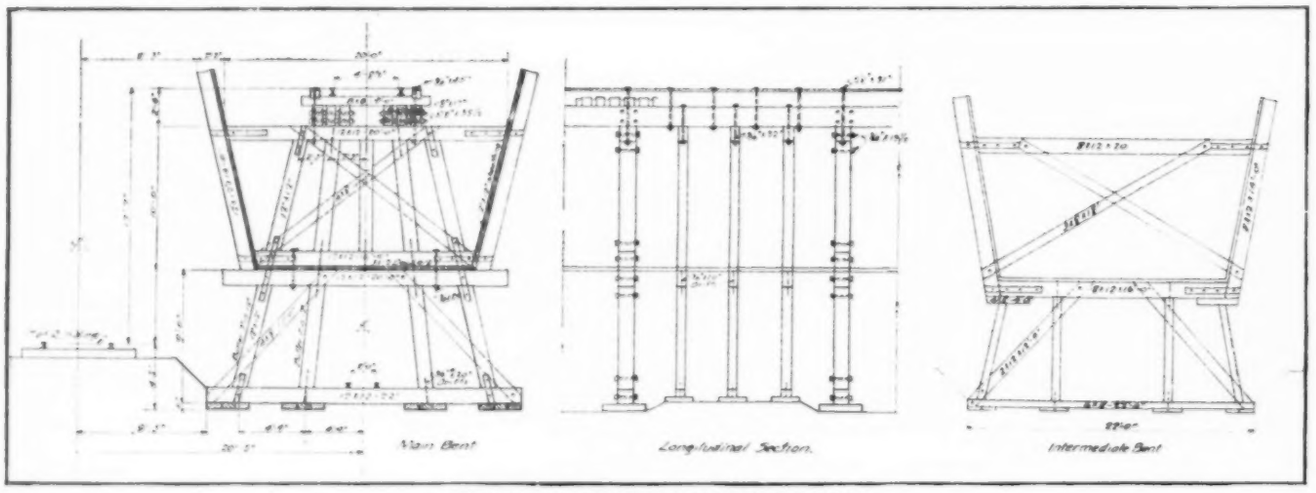
The foot of the grade begins at Station 2 and the top of the grade is at Station 6 + 40. The approach trestle begins at Station 2 + 80 and continues up to Station 6 + 40. From Station 6 + 40 to Station 9 + 40 or 300 ft., the grade is level and the track runs over the gravel and the sand bunkers. At the end of the sand bunker is the earth bumper.

In the construction of this trestle, the design of which is shown here, one of the objects obtained was to so construct the bents that they could be easily taken down and erected. For that reason it was necessary to use some U strap irons at the timber joint connections so that in moving the bents they would not be racked out of shape. The cross sections and the longitudinal sections shown give the details of the design, the size of timbers used and the clearances allowed.

The main bent consists of a complete individual bottom bent on top of which is attached a U-shaped bent. This U-shaped bent forms the material bunker. In the floor of this U-shaped bent which is also the decking of the bottom bent, are placed along its center line, tunnel traps which transfer the material from the bunker by gravity flow into the batch boxes which are on the small industrial cars operating on the narrow gauge railroad track which runs through the center of the bottom bent.

The main bents were spaced 15 ft. apart and three intermediate bents were placed between each pair of main bents. These were put in to add strength to the material bunker rather than to support the live train loads. The intermediate bents are not built as substantially as the main bents.

The material bunkers will hold 7 cu. yd. of material per lineal foot. The bunker for gravel is 195 ft. long so that it will hold 1356 cu. yd. of gravel. The sand bunker is 90 ft. in length and will store 630 cu. yd. of sand. Since two paving mixers operate from this material yard and the maximum yardage of concrete which these machines will pour is 400 cu. yd. per day or 200 cu. yd. per machine, this concrete yardage will require, since it is a 1:2:4 mix which is used, 340 cu. yd. of gravel and 172 cu. yd. of sand. The storage provided by these bunkers is, therefore, sufficient to take care of a 3½ day run. This quantity of storage was considered sufficient, due to the fact that Twohy Brothers have leased their railroad cars and have complete jurisdiction over them. They can have shuttle



DETAILS OF TRESTLE CONSTRUCTION

car service between the graved plant and the material yard. The three day storage supply will be sufficient to take care of shutdowns or trouble experienced at the gravel plant.

One of the interesting figures to note on this material yard layout is that it requires a land area of about 800 ft. long and 100 ft. wide. This land area can be obtained on most jobs to-day.

The narrow gage track runs along the center line of the trestle and underneath the bunkers and emerges from the trestle at Station 6 where it runs parallel to the industrial track, which leads to the bulk cement hopper scales and joins that track at about Station 4 + 50. The narrow gage track after passing underneath the cement loading scales is laid between the cement shed and the gravel bunker parallel to the bunkers joining the track which runs under the bunker at Station 10. The industrial narrow gage trains are first loaded with sand followed by gravel, and as a last operation receive their load of cement. The loaded train then proceeds to the paving mixer.

It is evident to anyone that a trestle of this size involves in its construction the handling of a lot of timber. This handling was done by means of a locomotive crane. The cost of constructing a trestle of this kind implicates considerable money and as a close estimate this trestle, including labor and material, cost in the neighborhood of $20 per lineal foot.

Considering the eight set-ups which have been chosen on this 280 mile program, and knowing that the cost of unloading material by clamshell and crane runs in the neighborhood of 25 cents a ton, it is readily apparent that jobs of this magnitude fully warrant the installation of a trestle of the type described.

ADVERTISE YOUR WORK

HERE'S a contractor—and in Spain, too—who is proud of his work and tells the world about it. A 12-ft. sign mounted on his chuting tower is seen daily by thousands of people traveling on the trains passing over the bridge under construction, which is in the outskirts of Barcelona.

E. Remy is an up-to-date hustling contractor and has a considerable amount of work in hand. He believes in making each of his jobs advertise him, thereby helping him to obtain new contracts.

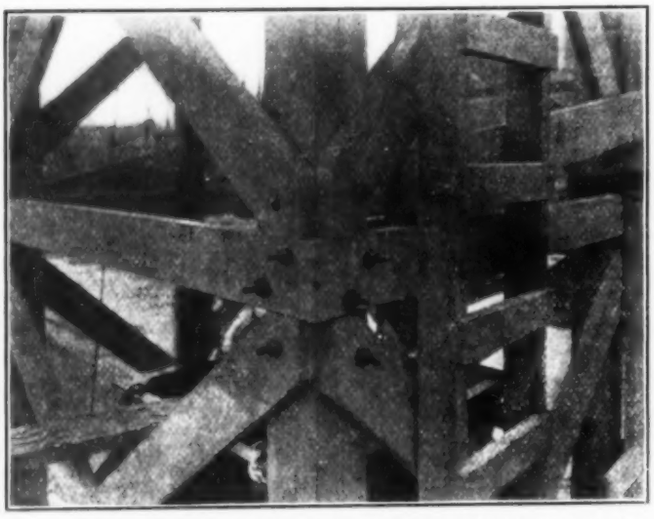
This particular structure is peculiar in design, being a combination of highway bridge and aqueduct, carrying storm waters across the railroad cut during the rainy season.

NO ONE CAN MISS THIS CONTRACTOR'S SIGN

GETTING THE MOST OUT OF WOODEN TOWERS

By J. H. Williams

IT is not only a mistake but a costly one to erect a wooden tower for chuting concrete with the expectation of having it last through only one job. This is particularly noticeable when you stop to consider the fact that by slight additional cost a permanent piece of equipment will result. The only additional cost necessary will be the labor required for the careful framing of the timber and the cost of bolts, used instead of nails, and these first costs are so slight, especially when compared with the saving effected by re-use of the tower, that they are of no consequence.



IF YOU'R TOWER IS PUT TOGETHER THIS WAY YOU CAN USE IT AGAIN

In building the tower it will be necessary to use skilled carpenters in order to have the timbers cut to proper dimensions, but these men will in themselves be an economy, as they will do more work in a day than the unskilled workman. Carefully constructed templets should be made. These templets should also contain the exact location of all bolt holes. In cutting the timbers care should be given to have them exactly duplicate of the templets.

After framing each piece of timber it should be marked with a number assigned to that particular size timber. In other words, the corner posts should all bear one number, the cross belts another, sway braces another, and so on. By so numbering, the workmen who are erecting the tower, can signal for a certain piece of timber and be assured that the proper piece will be sent up. Then there will be no laborious and dangerous fitting as each piece will fit exactly into place, and the time saved in the erection will more than pay for the extra cost of framing.

One of the most important things in erecting a tower is the guying, and the first thing that should be done is to locate the guy anchors, or dead-men, in order that there will be no excuse for continuing the building of the tower without guys. When the tower has reached a height of between 35 and 40 ft. the first set of guys should be immediately attached and drawn up properly to plumb the tower. With each additional 35 ft. the tower should be properly guyed. The resulting tower, when finished, will not only be straight and free from twists or kinks, but in addition will have been built without being subjected to the twisting and straining that is necessary to straighten it out if not properly guyed during erection. If built and guyed as above outlined the tower not only will be perfectly straight, but will perform satisfactorily as designed, as each piece will be performing the function that it was designed for in regard to tension and compression.

When the time for removal arrives the sections may be removed and lowered in bundles which will reduce the breakage of the lumber considerably. When the bundles reach the ground they should be separated into piles of like pieces; all damaged pieces removed and the remaining pieces stored until ready for use on next job. It is true that a few pieces of timber will be broken, also a few bolts will be lost or have the threads damaged, but we believe that the actual loss on each job will be less than 5 per cent, which, on a 100-ft. tower, would amount to less than 20 pieces of timber.

In addition to the saving another element should be considered, that is, the convenience of having stored and ready for use a certain definite number of feet of tower and knowing that, when work is started on the next job, it will be unnecessary to give time to the framing of the tower.

As the wooden tower has now become a part of the permanent plant, it should be painted. This painting should be done before the erection for the sake of the additional protection. From observation of many towers that have been so painted we would recommend a bluish-gray or stone color as the most serviceable. The piece number should be marked on each timber in black paint to avoid confusion in erection or storage. There are several advantages obtained by painting the tower other than the preservation of the lumber. A careless workman will hesitate in picking up a piece of painted timber, whereas, if it were unpainted, he would, no doubt, pick it up and use it for some other purpose, unmindful of the fact that money had been spent in carefully framing it for some particular purpose.

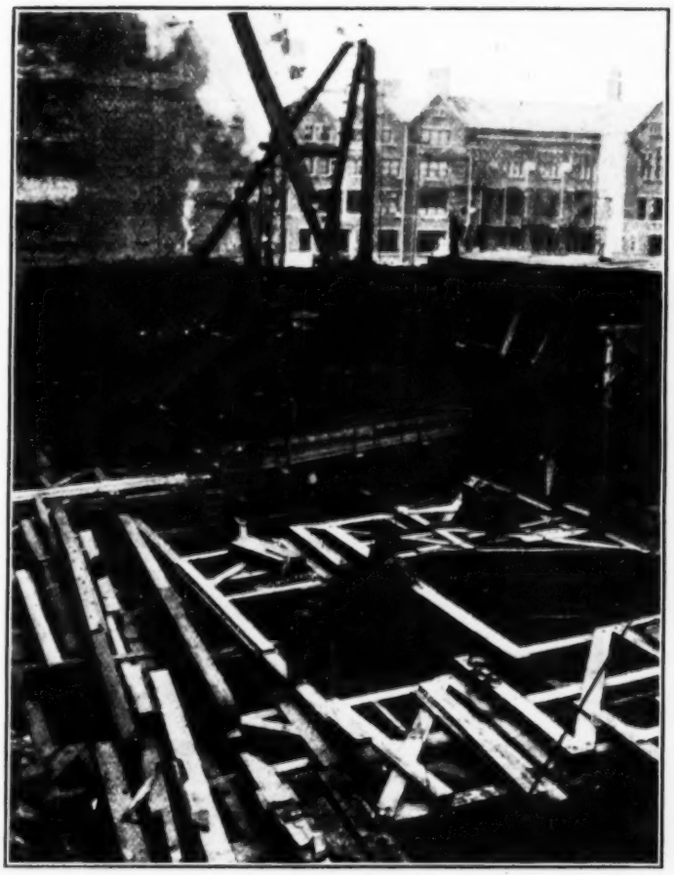
Contractors are now getting to the point where they take considerable pride in the appearance of their plant. Naturally a neatly painted tower will stand out conspicuously, speaking well for the contractor, especially if the balance of his job is in keeping with the tower in appearance. It is surprising how much favorable comment such a point will bring out among the laymen or people unfamiliar with construction work and as these are the people who employ the contractors the advertising value will probably more than pay for the cost of the painting.

Advertising opportunities such as this should be watched for by every contractor. He never knows when some man may be passing by who is contemplating some construction work and who is looking for a contractor to do the job. A neatly painted tower is only one of the ways in which the contractor may publish to the world the fact that he does his work efficiently. And when the world knows that the contractor will get the business.

Safety First in Shoring

EXCAVATING to a depth of 70 ft. below the street level in Manhattan for building work requires an absolutely safe means of supporting the adjacent streets and buildings. Holbrook, Cabot & Rollins, contractors on the new $8,000,000 addition to the American Telephone & Telegraph Building at Broadway and Fulton Street, New York, are using a method which is shown in the photograph and sketch, and which is considered satisfactory by the engineers.

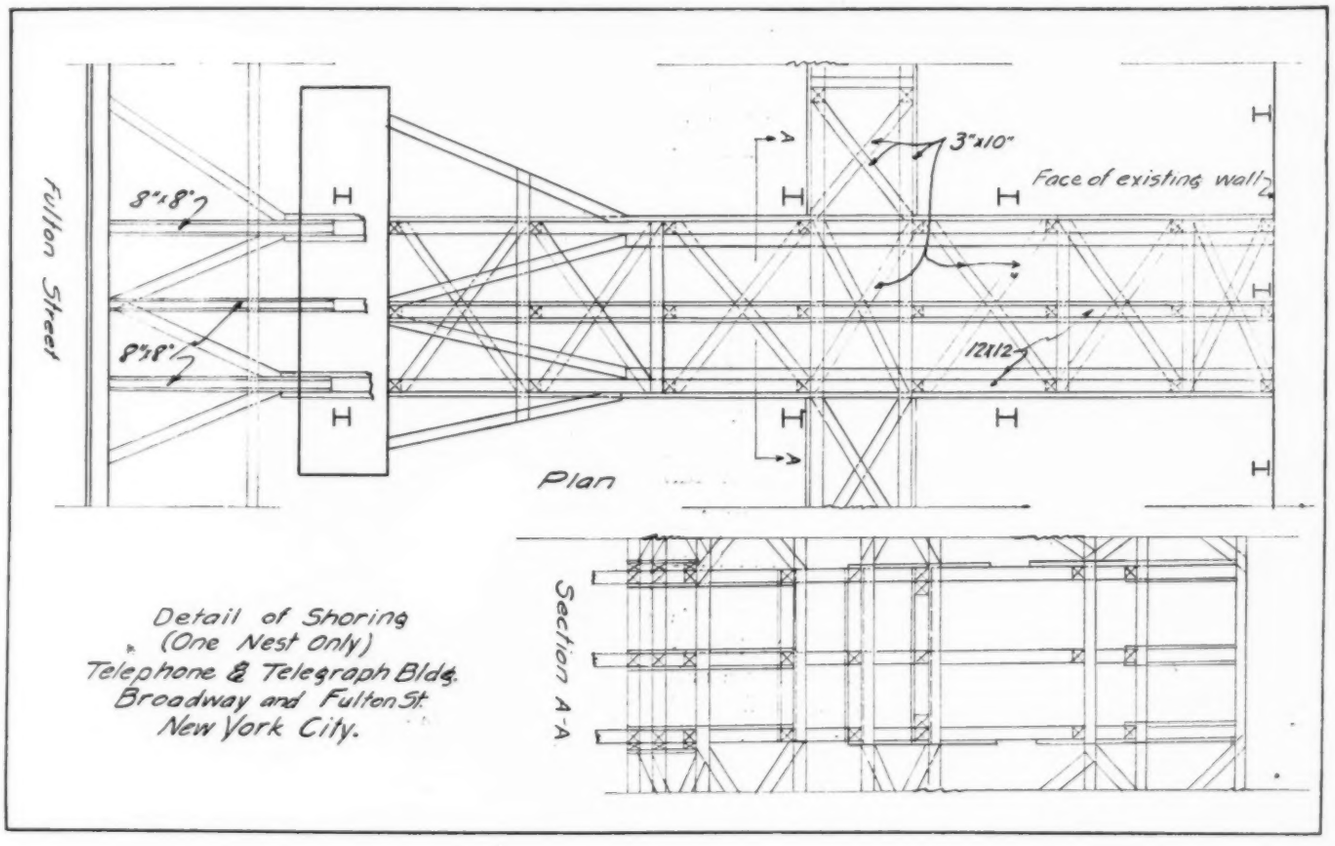
The plan and section below shows one of the nests which are placed on about 25-ft. centers. When the work of excavation was started, 12 by 12 timbers were laid on the ground and wedged up. Excavation to the next elevation was made and the next row of timbers laid as before. As the excavation was carried down the 12 by 12 was so cross braced that each nest acted as a truss, both horizontally and longitudinally. The nests are so placed as to clear the permanent steel work and the shoring is removed as the steel is placed.



LOOKING DOWN INTO THE MASS OF SHORING

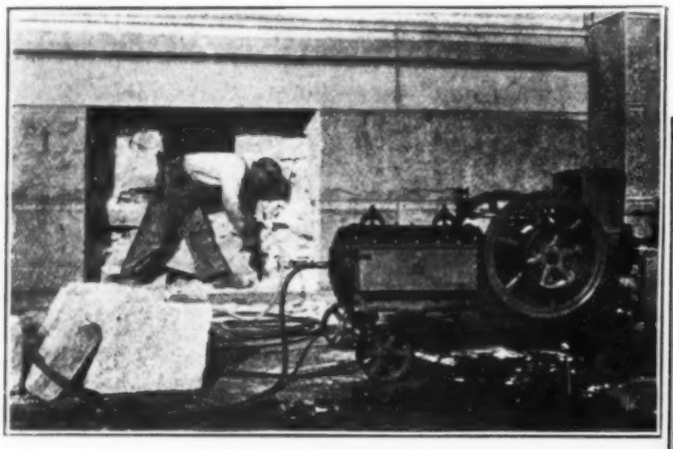
The merit in this job from a shoring standpoint is that it does away with the danger of undermining or displacing the posts. Also should any member be knocked out or broken, stresses in the broken member are taken care of by the diagonals, and no harm results. This is an important feature when it is remembered that buckets and skips are working overhead continually on this class of work.

This method is especially adaptable where a concrete caisson is used and a great depth is desired.



Portable Compressor Makes Job Easy

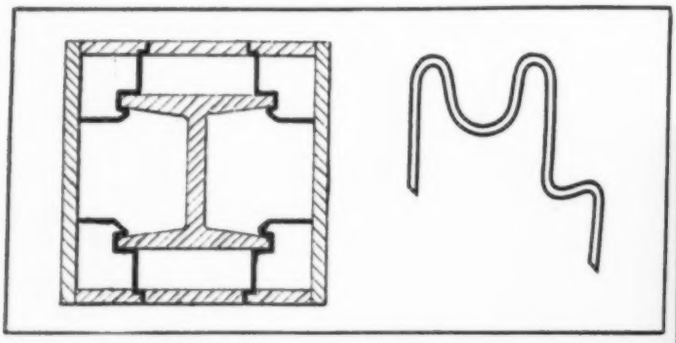
ONE of the many uses to which a portable air compressor may be put is illustrated in the accompanying photograph. One man using a drill is shown cutting out an opening in a stone wall for a window in the high school at Fitchburg, Mass. For cutting stone or concrete, this rig certainly beats the old method of using a drill or "bull point" with a maul.



TIME AND LABOR SAVED HERE

They Hold the Forms in Place

"THE biggest little thing in concrete construction outside of a nail" is the way the superintendent on a big job in Chicago referred to a little device he was using to hold column and beam forms to exact alignment for concrete fireproofing work. In fireproofing steel columns or beams, two rows of the clips, which are shown in the cross section, are driven into the edges of the narrow sections of forms and the forms are then snapped over the flanges of the steel column or beam. The clips hold the forms rigidly at the correct distance from the steel. The free ends of the clips are pressed in by the remaining form sections and tightly



COLUMN CLIPS REINFORCING CHAIR

grip the steel. The clips are of 7½ gage wire and are driven like a nail.

A similar device for holding floor reinforcing is shown in the illustration. Like the clips this "reinforcing chair" is of 7½ steel wire and is driven like a nail into the forms, the part protruding from the finished surface is twisted off by means of a claw hammer. Both the clips and the chairs are used in great quantities and with success on the Michigan Boulevard Viaduct, the Roosevelt Road Viaduct and other large jobs in Chicago.

Supporting Floor Forms Economically

TO support forms for concrete floors without the use of posts or shores of any kind is highly desirable. Add to this feature, the advantage of using preconstructed all wood forms which can be used many times and which require no nails in their erection, and you have the essentials of the system used by Bergendahl & Acher, Inc., Chicago, in constructing the floors of the new Chicago & Alton combination freight house, warehouse and office building which is being built at Harrison Street and the Chicago River, Chicago.

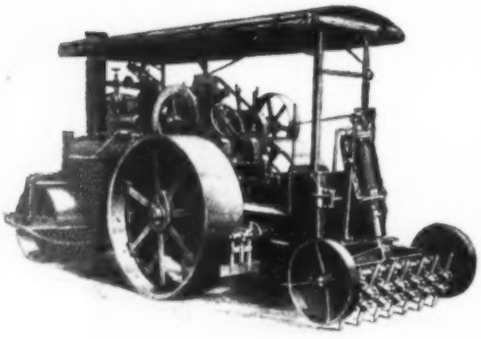
The reinforced concrete floors are known as the ribbed

THE CENTERING IN PLACE

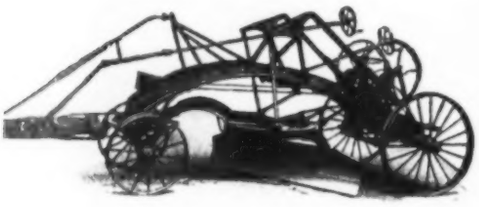
slab or slab and joist type. In each panel the ribs or joists extend longitudinally between concrete beams. The forms consist of all wood preconstructed centering made up in two units, the manner of interfitting and interlocking being such as to allow one unit to be removed ahead of the other in order to reduce to a minimum the amount of centering required. The trusses used make posts or shoring unnecessary, thus making available for other purposes the space usually taken by them. The headroom under the trusses is sufficient to clear a man.

AFTER THE FORMS HAVE BEEN REMOVED

GOOD ROADS



Austin Steam Roller with Scarifier Attachment



Austin Giant Grader

Aurora Crushing and Screening Plant

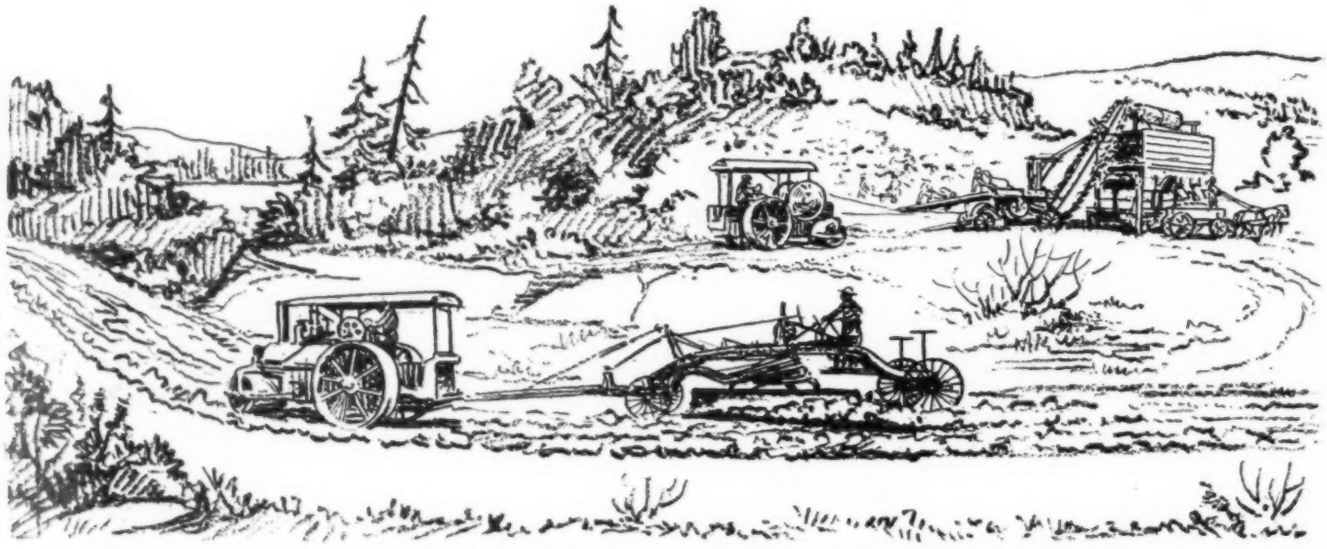
Communities no longer question the need or value of Good Roads.

There was a time when there was more or less indifference toward the question of Good Roads. Hundreds of roads were well nigh impassable and even the best would hardly be tolerated today. Those who travelled soon realized that Bad Roads would never lead to Prosperity.

Traffic in general follows the more substantial roads and the communities who early adopted a road building program had the early start in reaping the benefits of closer communication with the world's market.

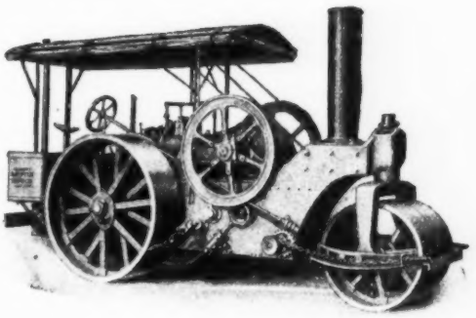
So necessity gave birth to the thought of today—Good Roads—Prosperity.

The important question suggested by this to the Contractors and Municipalities today is "How can we build better roads more economically?"



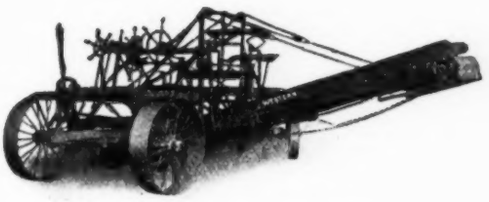
PROSPERITY

Materials and methods of construction are practically standardized so the answer must be found in the use of equipment. Economy in road construction costs must therefore depend upon the machinery with which the work is done.



Austin Motor Roller

And this is where the Austin-Western Line offered its advantages. Only tried and tested principles of construction and design are combined in the Austin-Western Line.



Western Elevating Grader

Austin-Western Quality-Built road machinery is cheapest in the long run. Its economy will be found in its ability to perform and stand up day in and day out under the strain of hard work.

Western Scarifier

The Austin-Western Road Machinery Co., Chicago

New York	Columbus	Nashville	Pittsburgh	San Francisco
Albany	Philadelphia	Atlanta	Dallas	Los Angeles
Boston	Louisville	New Orleans	St. Paul	Portland
Richmond	Memphis	Jackson	Salt Lake City	Oklahoma City

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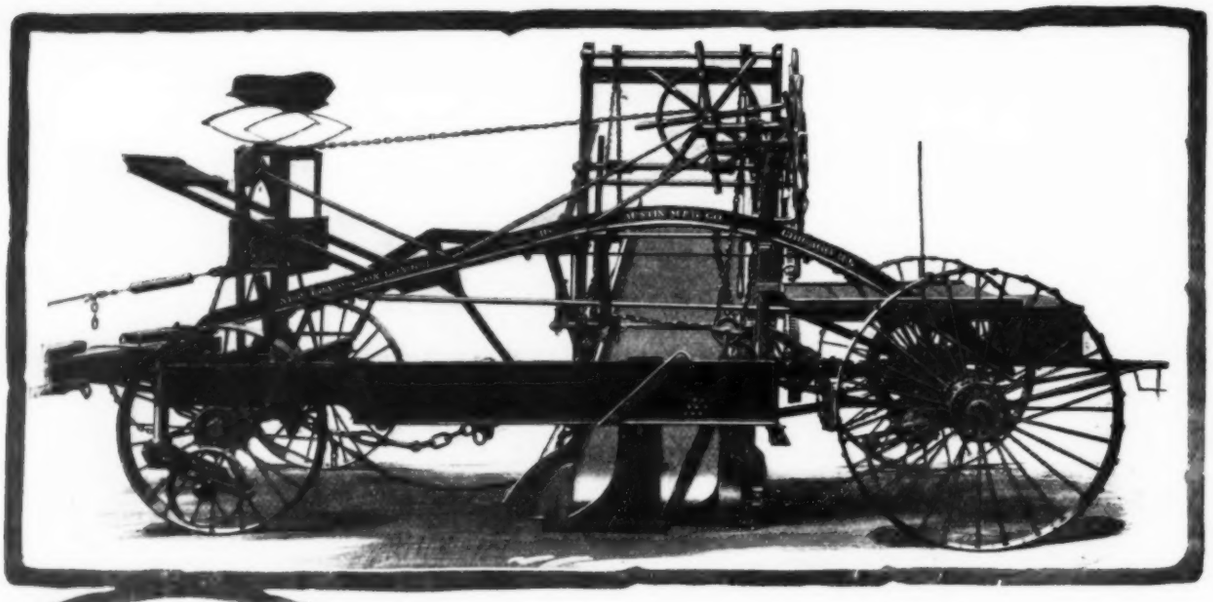
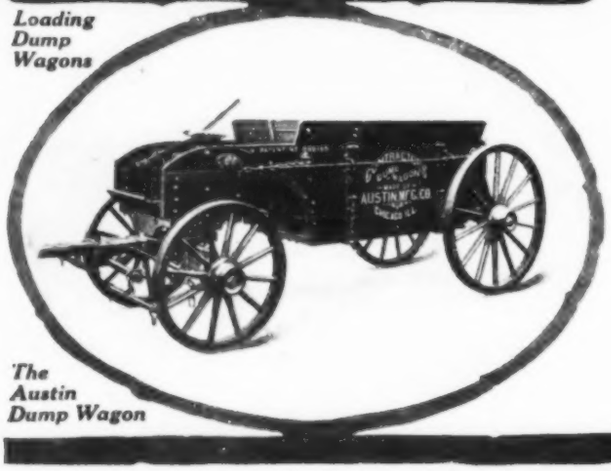


In Action

Loading Dump Wagons



The Austin Dump Wagon

Making the Dirt Fly on Highway and Railroad Construction Work

YOU old-time contractors who know the game inside and out don't have to be told about the New Era Elevating Grader. You know it's a fundamental need in building profits.

So, too, with Austin Dump Wagons. But we are all too apt to forget old friends. So here are the "whys and wherefores."

The New Era Elevating Grader

Moves more than 1000 cubic yards in an ordinary working day, and does it so easily, quickly and cleanly that you hardly realize the great volume of work done.

It loads your wagons — keeps them jumping to match its pace.

It cuts digging and handling costs way down — and here is where your profit is made or lost — on that grading job.

Austin Dump Wagons

These sturdy, easily handled wagons are fit companions for the "New Era" Grader. They dump easily and quickly. Never lose time in stopping the team or fussing around.

They're built right to give real service. Ask for catalogs describing Austin Equipment.

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PARSONS

"You Have Built This Machine with the Necessities of All of Us in Mind"

REED AND WHEELOCK
Clay Center, Kansas

Mr. Reed goes on to say, "You will doubtless be interested to know how both our Model 36's have been standing up for the past two years. We are frank to say that we have watched their performance very critically as we are experienced trench machine users and know what to expect from a machine.

"Our experience to date makes us confident that we have bought the best possible 'buy' on the market, and we make this statement with the full knowledge of other types of trench machines.

"From talks with my operators and Superintendent, and also from personal observation, I have received the impression that you have built this machine with the necessities of all of us in mind. To illustrate my point, my operator tells me that it is easy to operate, that it is easy to get at, and that it takes little attention. My Superintendent tells me that the machine can dig faster than my men can lay pipe, also that hardly any stoppages are ever necessary, and that yardage is always high regardless of the soil.

"As for myself, I can only say that the service we received from you leaves nothing to be desired. I have only to look at my maintenance charges for the machine to know that we are exceedingly well pleased with our investment.

"We are glad to tell you that we are—'Parsons Boosters.'"

Reed and Wheelock own one—Model 78, two Model 36's Parsons Trench Excavators and one Model 10 Parsons Backfiller.

You will find that Parsons users are Parsons boosters—that they like and appreciate Parsons Service and Parsons policy. Write for descriptive literature.

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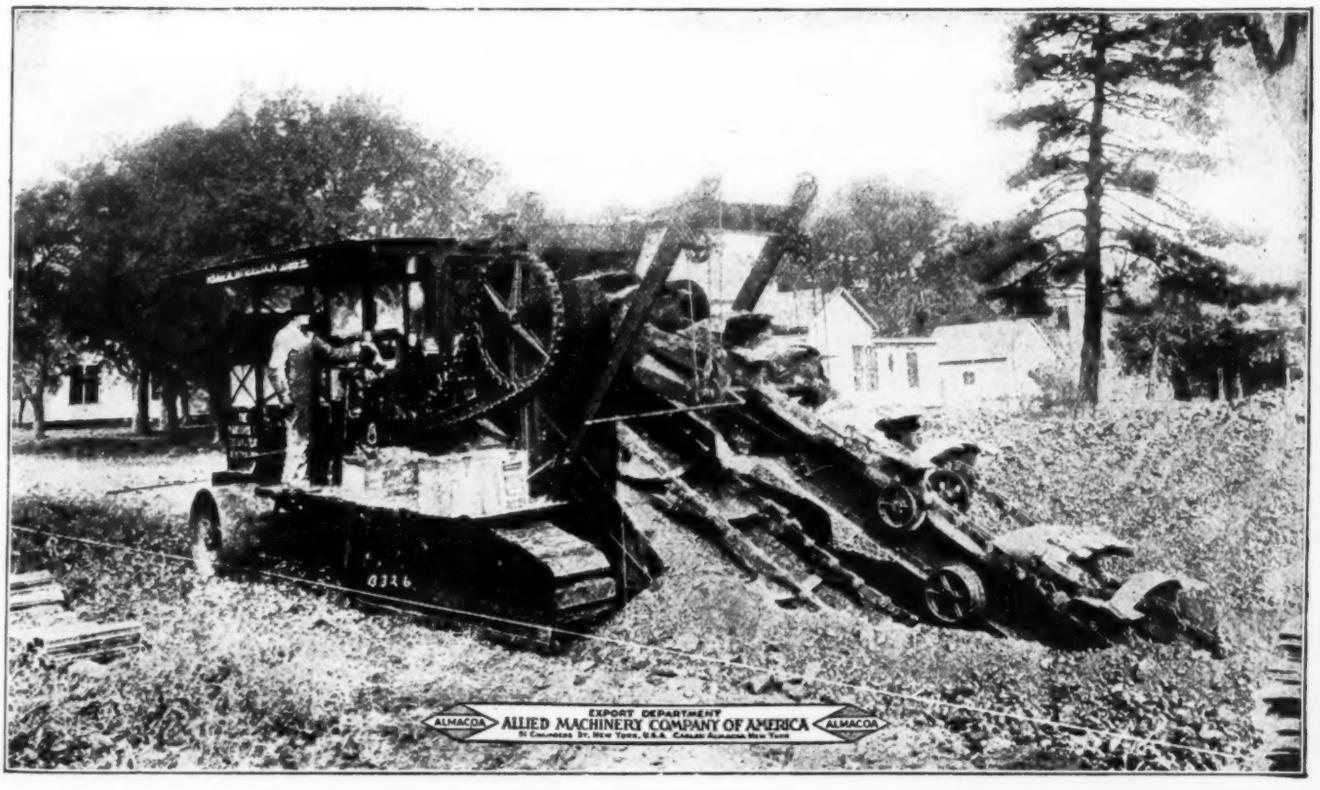

Side by Side with a

IN MANY classes of work, the B-G Loader is handling the same capacity and working under the same conditions as a locomotive crane or steam shovel. It does not claim to compete with a crane or shovel in all classes of work, but in handling loose bulk materials in capacities ranging from 25 to 500 yards per day, the B-G Loader offers the most economical means of loading material.

Direct comparison was possible on one job where a 1-yard crane and a B-G Loader were loading silica gravel into trucks from the same large stock pile. The best record for one day made by the crane was 147 loads, while the Loader made a mark of 232 loads in the same time. Often the Loader exceeded the best record made by the crane. Every truck had a capacity of $2\frac{3}{4}$ cubic yards, so that there was no difference in the average shown.

COST ANALYSIS:

1-Yard Crane		B-G Loader	
Engineer	$10.00	Engineer	$ 7.00
Helper	7.00	Gas	4.00
Coal	14.00	Oil	1.00
Oil	2.00		
	$33.00		$12.00
147 loads x $2\frac{3}{4}$ = 404.25 cu. yds. a day		232 x $2\frac{3}{4}$ = 638 cu. yds. a day.	
$33.00 ÷ 404.25 = $.08 per yd.		$12.00 ÷ 638 = $.018 per yd.	

Cost per yd. with Crane	**$ .08**
Cost per yd. with B-G Loader	**.018**
Saving: Loader over Crane, per cu. yd.	**$ .062**

Had depreciation been included in this analysis, the comparison would have been even more favorable to the B-G Loader. Initial cost, depreciation, interest, taxes, and repairs are all much less on a Loader than on a Crane.

The man who wishes a machine with high capacity and loading ability that is economical both as to first cost and every day operating cost should investigate the B-G Loader. Our representatives are located in most of the principal cities. They will be glad to furnish engineering advice at no obligation to you. If you are interested in the Loader, write for leaflet B today

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BARBER-GREENE COMPANY

AURORA, ILLINOIS, U. S. A.

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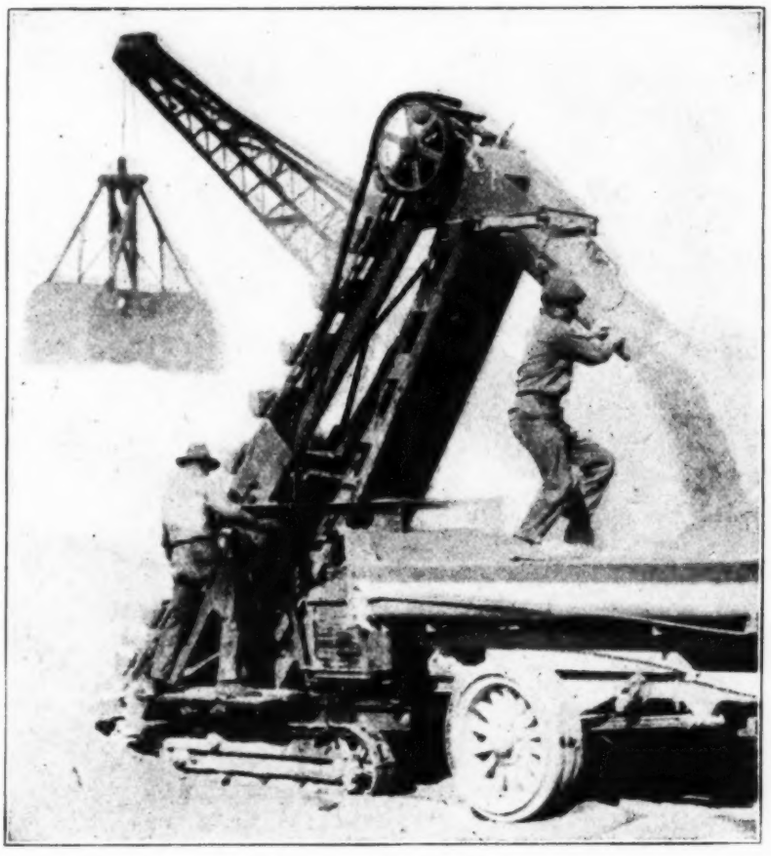
EXPORT DEPARTMENT: ALLIED MACHINERY COMPANY OF AMERICA
51 Chambers Street, New York City

Locomotive Crane



This disc feeder has been used on all B-G machines for four years. Material is carried on the discs to the buckets and shovelers eliminated. Absolutely safe.

A few copies are left of our booklet giving the cost data on concrete road construction. Material handling costs on six different road jobs are analized.

A Few B-G Users

Standard Bitulithic Co., Elizabeth, N. J.
Scott Brothers, Rome, N. Y.
Union Paving Co., Philadelphia, Pa.
Mellert-Weidener Co., Medina, Ohio
City of Flint, Michigan
Timberlake Construction Co., Indianapolis, Ind.
R. F. Conway Co., Chicago, Ill.
Badger Construction Co., Milwaukee, Wis.
James Horrabin, Des Moines, Iowa
General Contracting Co., Minneapolis, Minn.
Metropolitan Paving Co., St. Joseph, Mo.
A. L. Cook, Ottawa, Kansas
City of Denver
Twin Falls Highway District, Twin Falls, Idaho
Chico Contracting Co., Chico, Cal.
Kaiser Paving Co., Seattle, Wash.

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The CLYDE-KEITH EXCAVATOR is especially adapted for ditching work or any excavation below the level of the bottom of the machine. The bucket digs best when cutting in an upward direction.

It is built on an all steel sliding frame having upturned ends and bottom plated all over, and is fitted with a standard four drum double cylinder main engine, an independent swinging engine, bull wheel, mast and "A" frame, main boom, dipper stick and bucket.

Built in two sizes with bucket capacities of three-quarters and one yard.

Clyde-grade workmanship prevails throughout. It is covered with the usual Clyde guarantee against original defects.

WRITE FOR LITERATURE GIVING DETAILED SPECIFICATIONS

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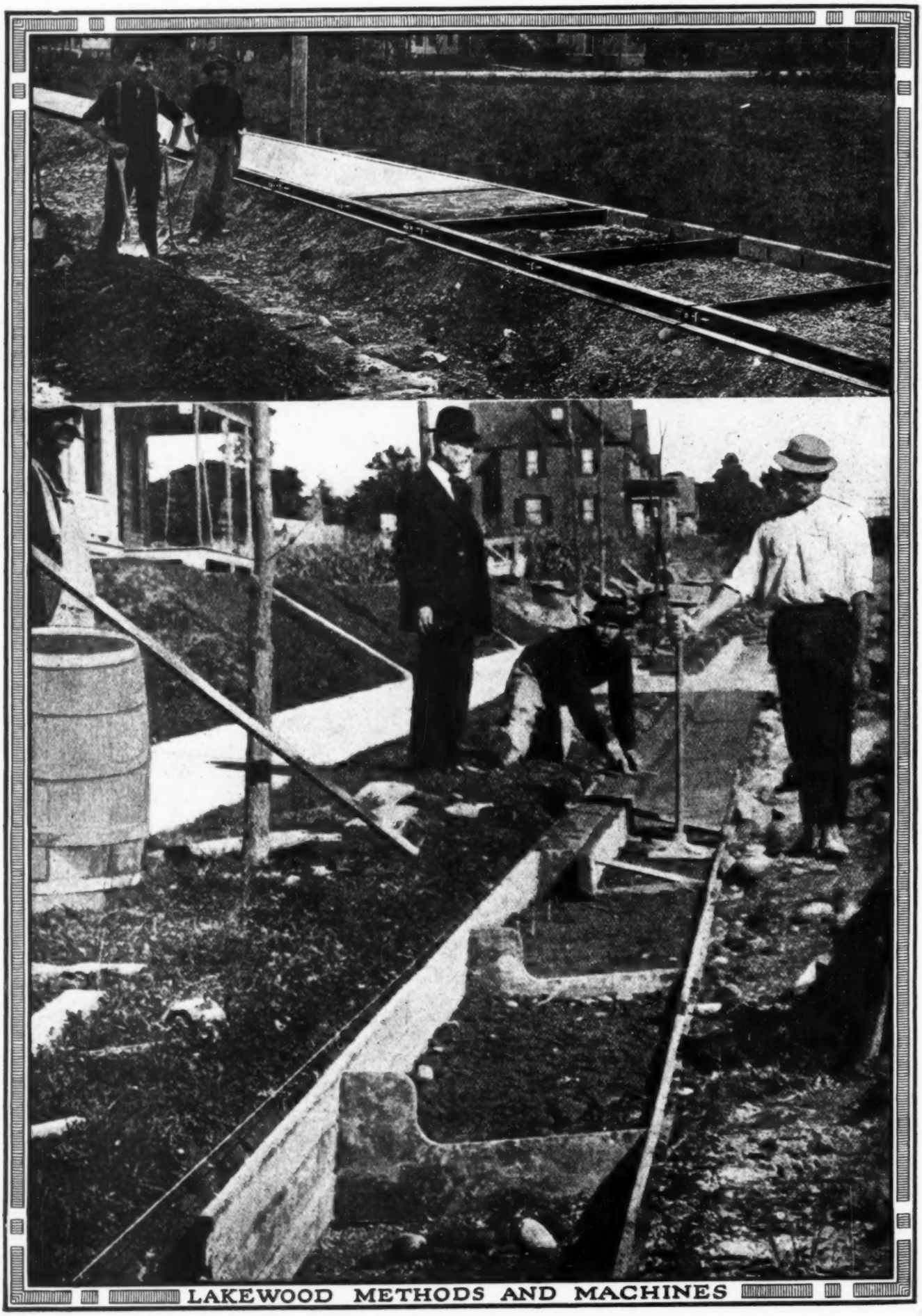
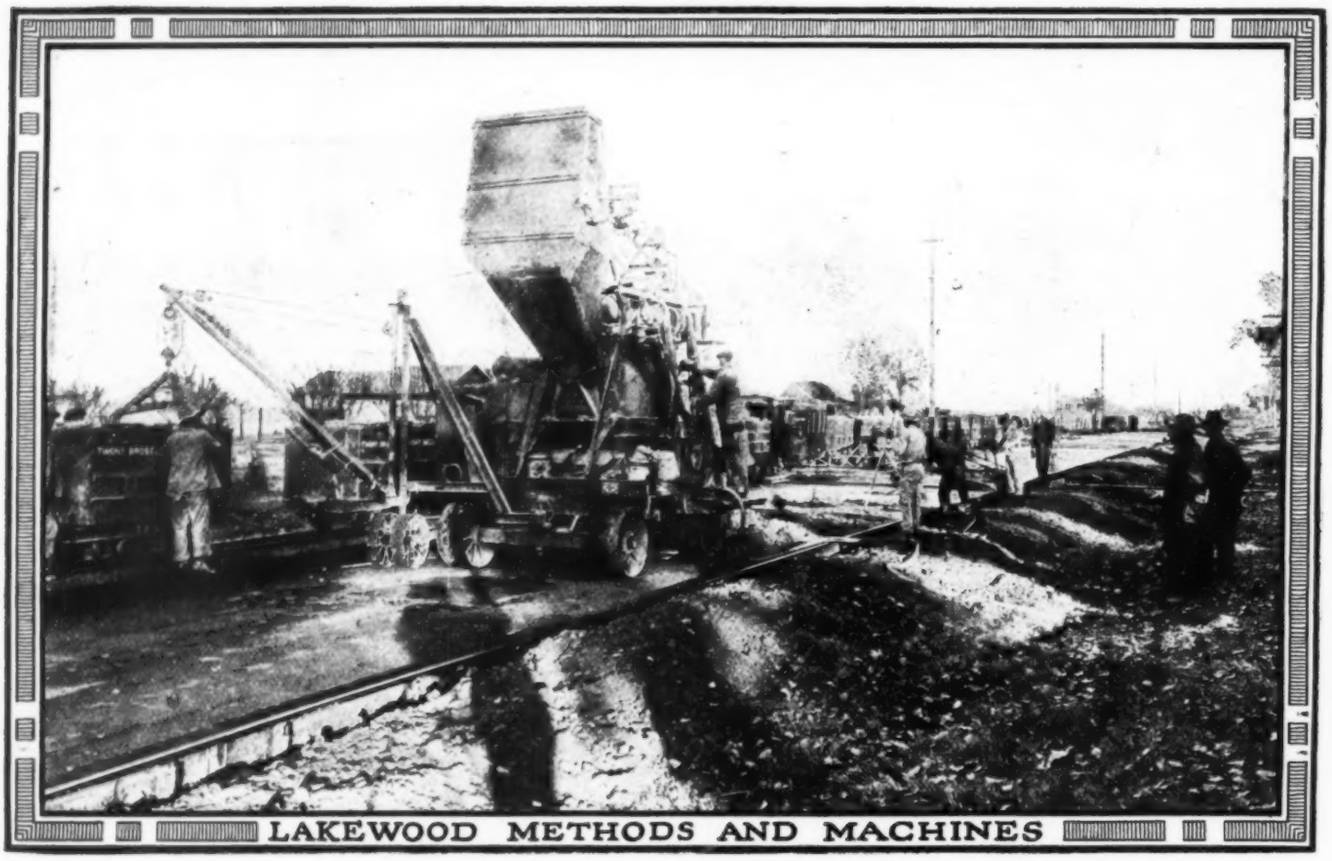
CLYDE *The* CLYDE

Representatives In Principal Cities~



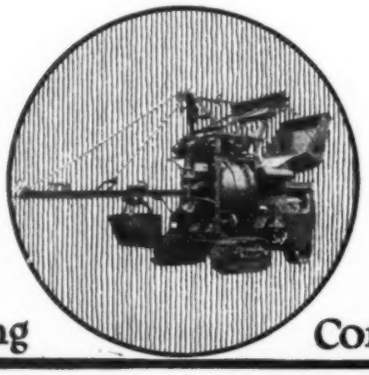
LAKEWOOD METHODS AND MACHINES



World's Biggest Road Job is Lakewood Equipped

The Maricopa County, Ariz., contract for over 280 miles of concrete roads recently awarded to Twohy Bros., is the largest road job in the world. The work must be completed within three years. This job is equipped throughout with Lakewood plant—pavers, finishing machines, track, subgraders, forms, batch box cars, gasoline locomotives, pumps, cement handling plant, tunnel traps.

An attractive booklet describing this work is ready for distribution. Ask for a copy of "Better Good Roads for Maricopa County."



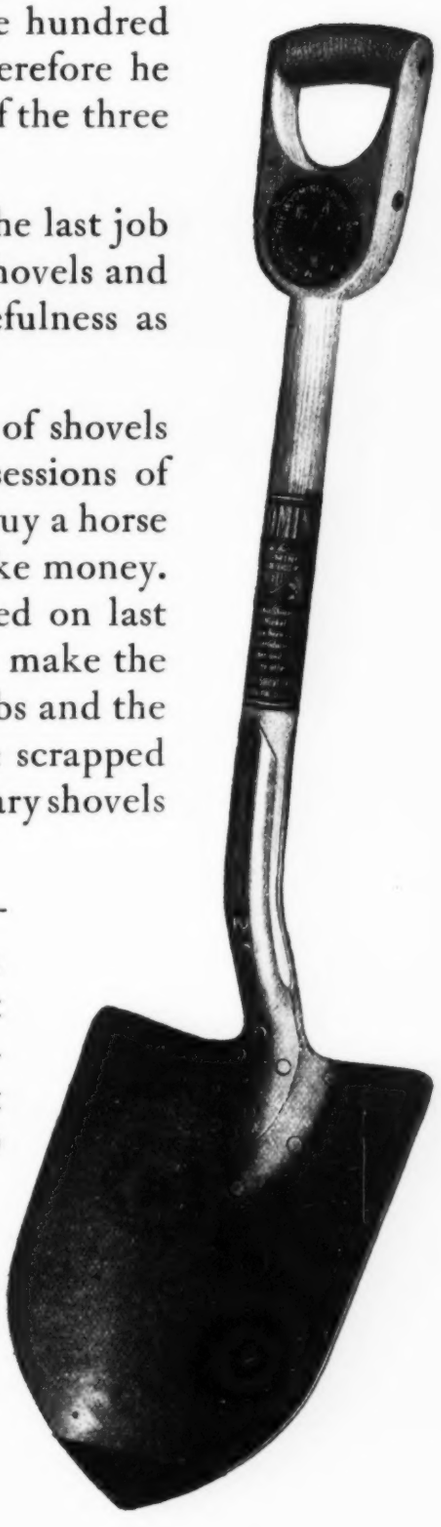
The Lakewood Engineering Company, Cleveland U.S.A.

THE other day a sewer Contractor was awarded a job on which he will have to employ three hundred men. He didn't use Red Edge last year, therefore he had to buy a full equipment for every man of the three hundred.

He didn't have one pick or shovel left from the last job on which he admitted that he had used the shovels and picks long after they had outlived their usefulness as money-making tools.

If it is economy to buy three or four outfits of shovels and picks per year and have three or four sessions of using rapidly wearing out tools, then we can buy a horse for $300.00 and sell him for $200.00 and make money. Red Edge have just won a big contract based on last year's performance against other shovels. To make the game even, Red Edge were put on the hard jobs and the others on the easy. When the shovels to be scrapped were counted in the Fall, there were nine ordinary shovels to *one* Red Edge.

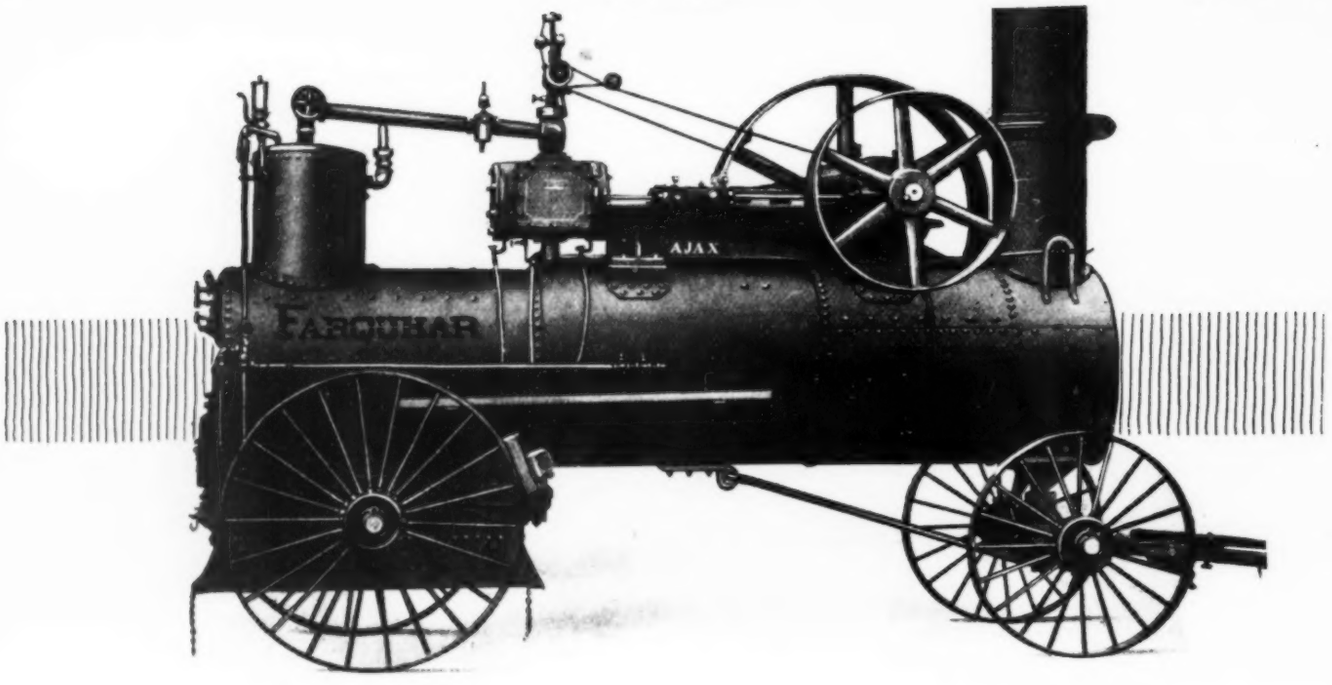
That is the story that counts: 50% Red Edge—50% ordinary at the beginning of the Season; 10% Red Edge—90% ordinary thrown out at the end of the Season. Don't consider anybody's convenience—consider your own profit and BUY RED EDGE SHOVELS AND PICKS.



THE WYOMING SHOVEL WORKS

WYOMING, PENNA., U. S. A.

WYOMING
RED EDGE
SHOVELS



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